ENVIRONMENTAL IMPACTS ON TRAINING AND READINESS

presented to the

Joint Staff-OSD Sponsored Workshop on Environmental Considerations in Military Operations and Global Basing

by

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OVERVIEW

- **Goal and Mission**
- **New Submarine Threat**
- **Complex Environment Requires Active Acoustics**
- **Sonar and Strandings**
- **RIMPAC**
- **USWTR**
- **Monitoring, Mitigation, Conservation**
- **Way Ahead**

THE GOAL

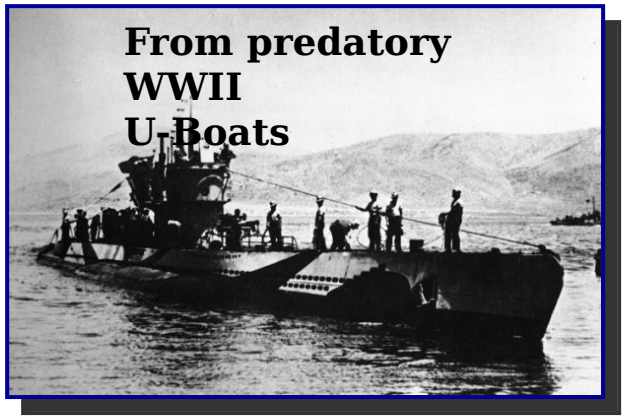
Protect Our Nation AND the Environment

THE U.S. NAVY MISSION

- **Global Presence**
- **Maintain Freedom of the Seas**
- **Protect Territories**
- **Protect Vessels & Battlegroups**

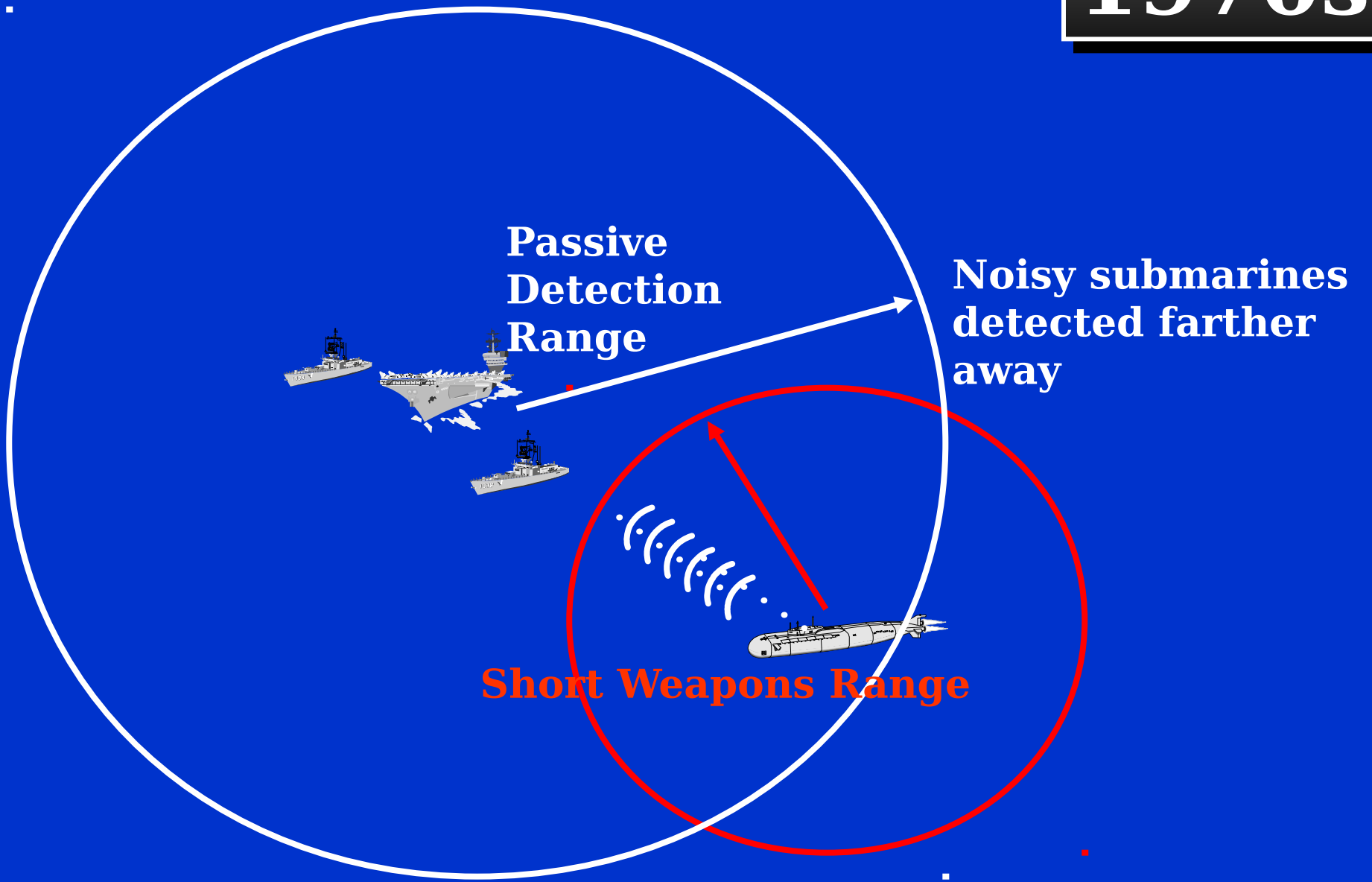
THE NEW SUBMARINE THREAT

From Deep Ocean to Shallow Coastal Waters



THEN

1970s


Passive
Detection
Range
Noisy submarines
detected farther
away
Short Weapons Range

LATER

1990s

Passive Detection Range

Quieter submarines aren't detected until close in

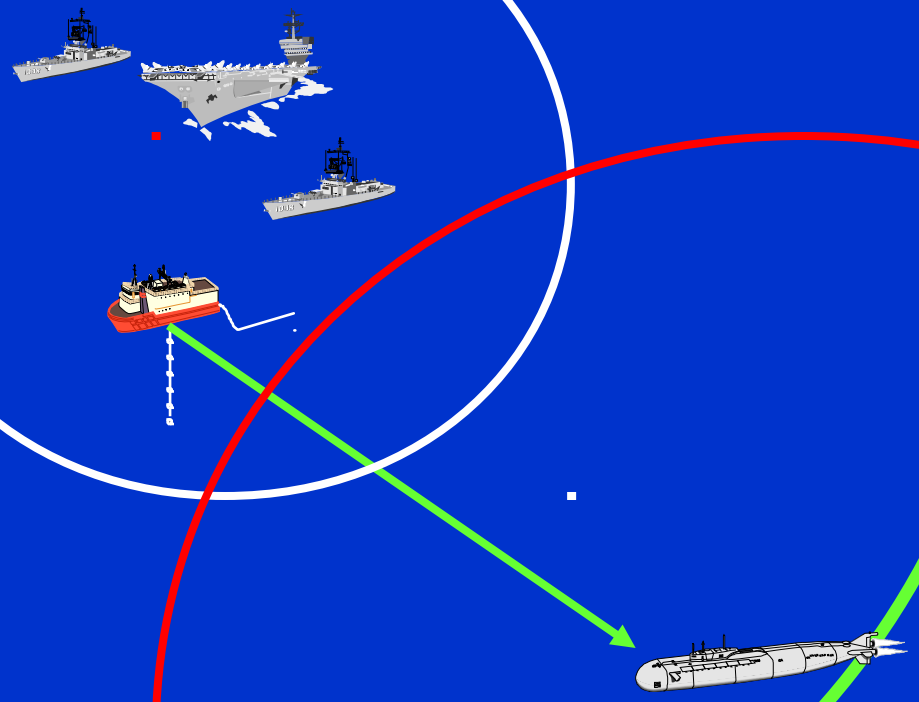
Weapons Range

Longer weapons range makes ships vulnerable before detection

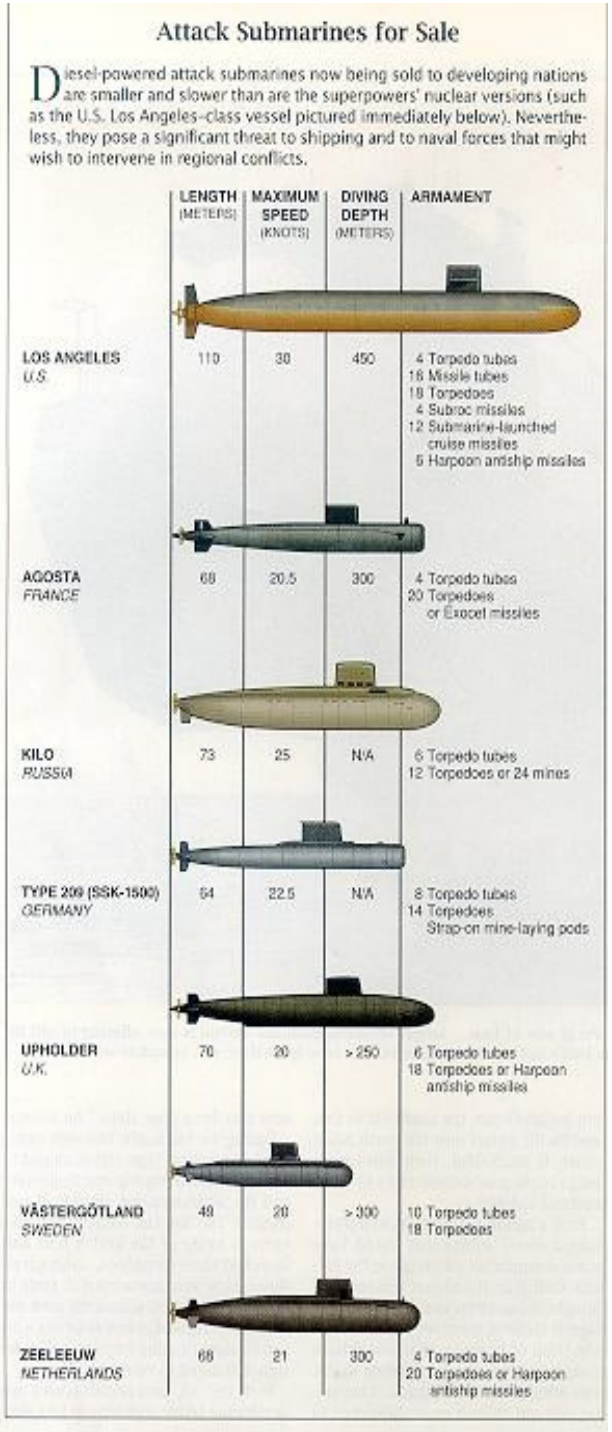
NOW

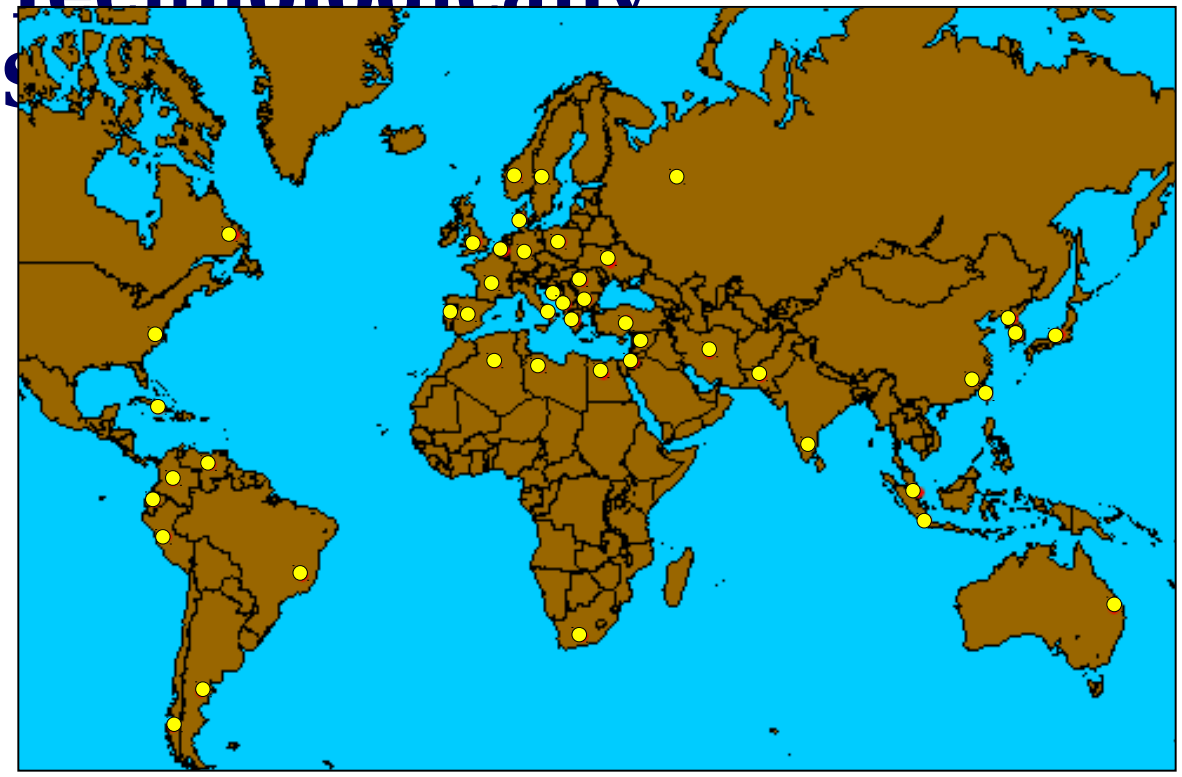
2006

Low Frequency Active Sonar will regain long range detections providing many hours to react



Attack Submarines for Sale: Quiet, Lethal, Technologically

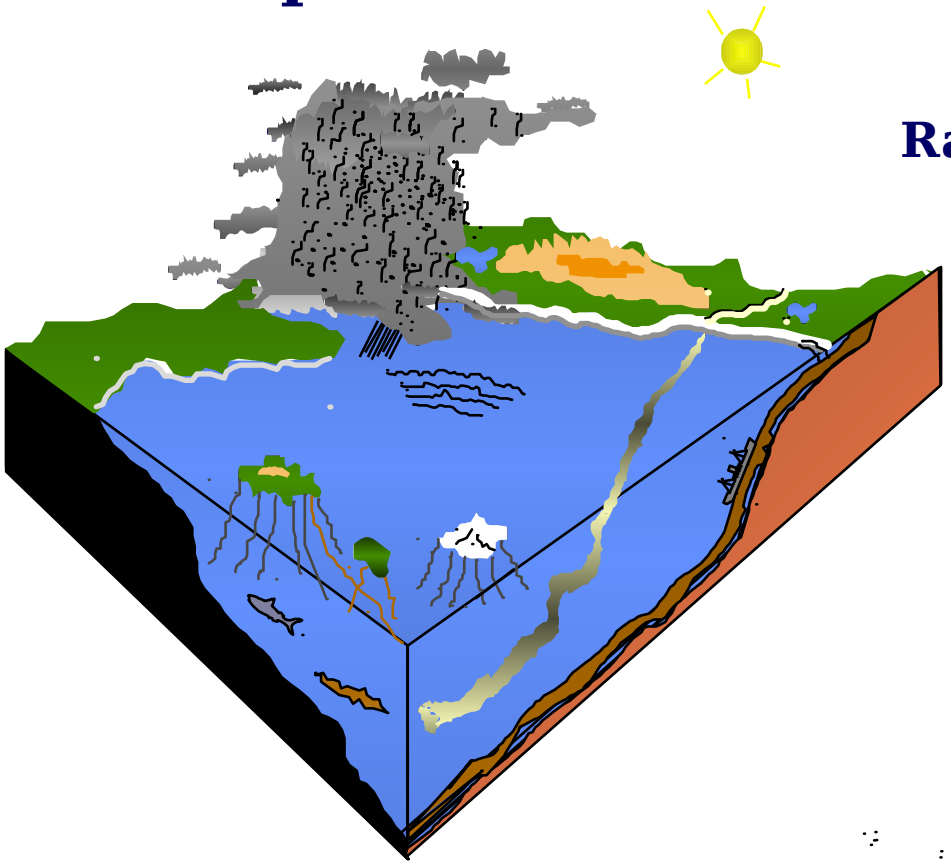




Today, 45 countries have a total of 495 submarines worldwide, both diesel-

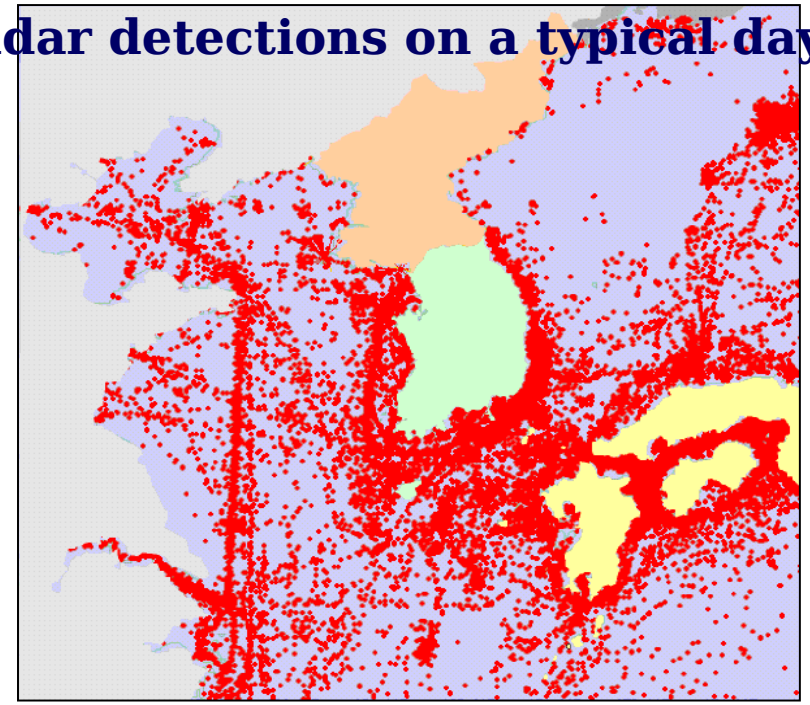
THE COMPLEX COASTAL ENVIRONMENT

Complex Environment



Vessel Density

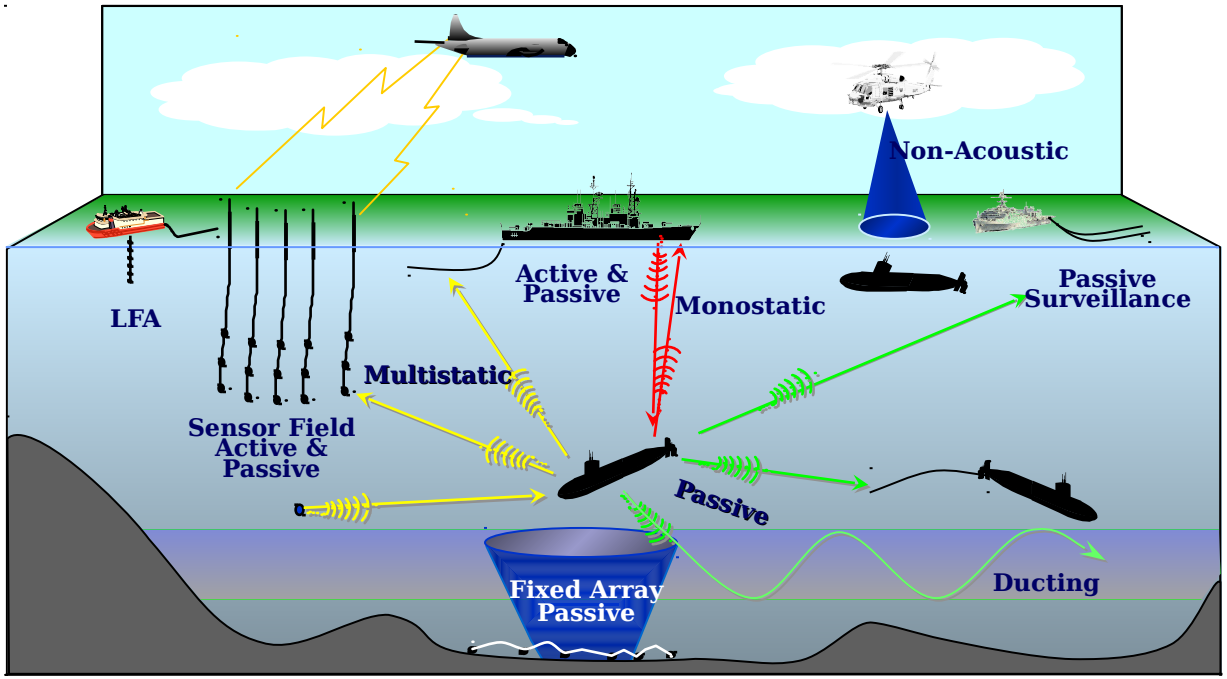
Radar detections on a typical day



COMPLEX ENVIRONMENTS AND VARIOUS TACTICAL SITUATIONS REQUIRE DIFFERENT SYSTEMS

- **Passive Acoustics**
  - Noisy Contacts
  - Line of Bearing
- **Active Acoustics**
  - Quiet Contacts
  - Range and Bearing
- **Other**
  - Radar
  - Magnetic
  - Visual

ASW TOOLS



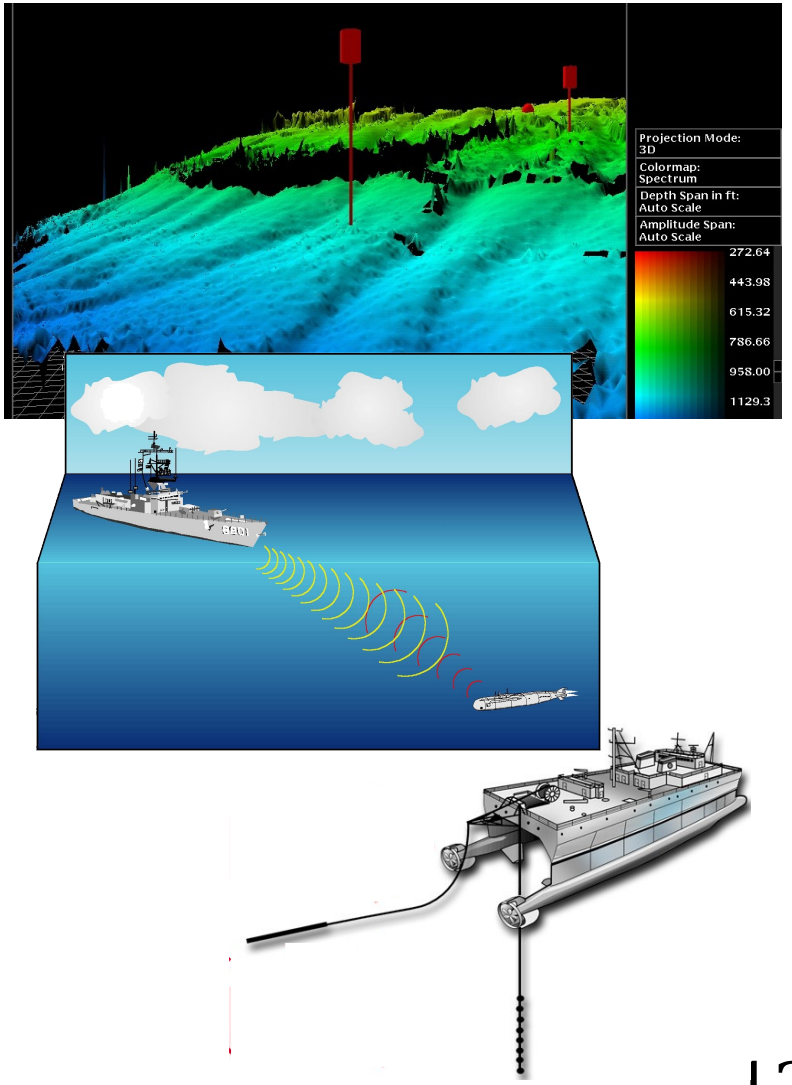
Active acoustics is a VITAL SENSOR

ACTIVE SONARS - HIGH, MID, LOW FREQUENCIES

- **High-frequency > 10kHz**
  - Mine Hunting Sonars
  - Torpedo Sensors
  - Fathometers
  - Acoustic Energy Greatly Attenuated
  - Typical Range < 2000 m

- **Mid-frequency 1kHz-10kHz**
  - Ship and Submarine Sonars
  - Force Protection and Tactical Prosecution
  - Moderate Attenuation
  - Typical Range ~5 nm

- **Low Frequency < 1kHz**
  - Long Range Search & Surveillance
  - Less Attenuation
  - Typical Range 50 to 150 nm



HISTORY OF SIGNIFICANT EVENTS

JAN 06	**Four beaked whales strand on Spanish SE coast IVO NATO ASW exercise**
JUL 04	**Two dead whales beached in the Canary Islands IVO NATO ASW exercise**
JUL 04	**Pod of melon-head whales behave strangely in Hanalei Bay IVO RIMPAC exercise**
MAY 03	**14 harbor porpoises died IVO USS SHOUP mine hunting exercise in Haro Strait**
SEP 02	**14 beaked whales stranded in the Canary Islands IVO NEO-NAPON exercise**
APR 02	**Beaked whale and humpback whale stranded near Vieques**
MAY 00	**4 beaked whales stranded Madeira IVO NATO exercise**
MAR 00	**17 beaked whales stranded in Bahamas IVO Navy "Choke Point" exercise**
OCT 99	**Four beaked whales stranded in U.S. Virgin Islands**
JAN 98	**Beaked whale "stranded suspiciously" at Vieques (NOAA Fisheries biologist)**
MAY 96	**12 Cuvier's beaked whales stranded west coast of Greece**
1985-1989	**At least three standings of beaked whales in the Canary Islands**

Events 2-12 cited in NRDC ltr of 9 Feb 05, "Request for Review of NATO Actions Involving Active Sonar"

Events positively correlated to use of active sonar in the vicinity

AN INTERNATIONAL ISSUE

- **International Whaling Commission's (IWC) – Jul 04**
  - **Scientific sub-committee findings that "there is now compelling evidence implicating anthropogenic sound as a potential threat to marine mammals. This threat is manifested at both regional and ocean-scale levels that could impact populations of animals."**
- **European Parliament (EP) Resolution – Oct 04**
  - **Calling on members to restrict the use of high-intensity active naval sonar until more is known about the harm it inflicts on whales and other marine life.**
- **Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea, and Contiguous Atlantic Areas (ACCOBAMS) resolution (16 European, North African, and Mid-East countries) – Nov 04**
  - **Calling for "extreme caution" in conducting activities that produce intense underwater noise, including military sonar activities.**
- **International Union for the Conservation of Nature and Natural Resources (IUCN) -World conservation Union resolution – Nov 04**
  - **Calling for urgent action by states to reduce the impacts of high-intensity naval sonar systems on beaked whales and other vulnerable species.**
- **NRDC ltr of 9 Feb 05, "Request for Review of NATO Actions Involving Active Sonar"**

ACTIVITY EFFECTS IN PERSPECTIVE

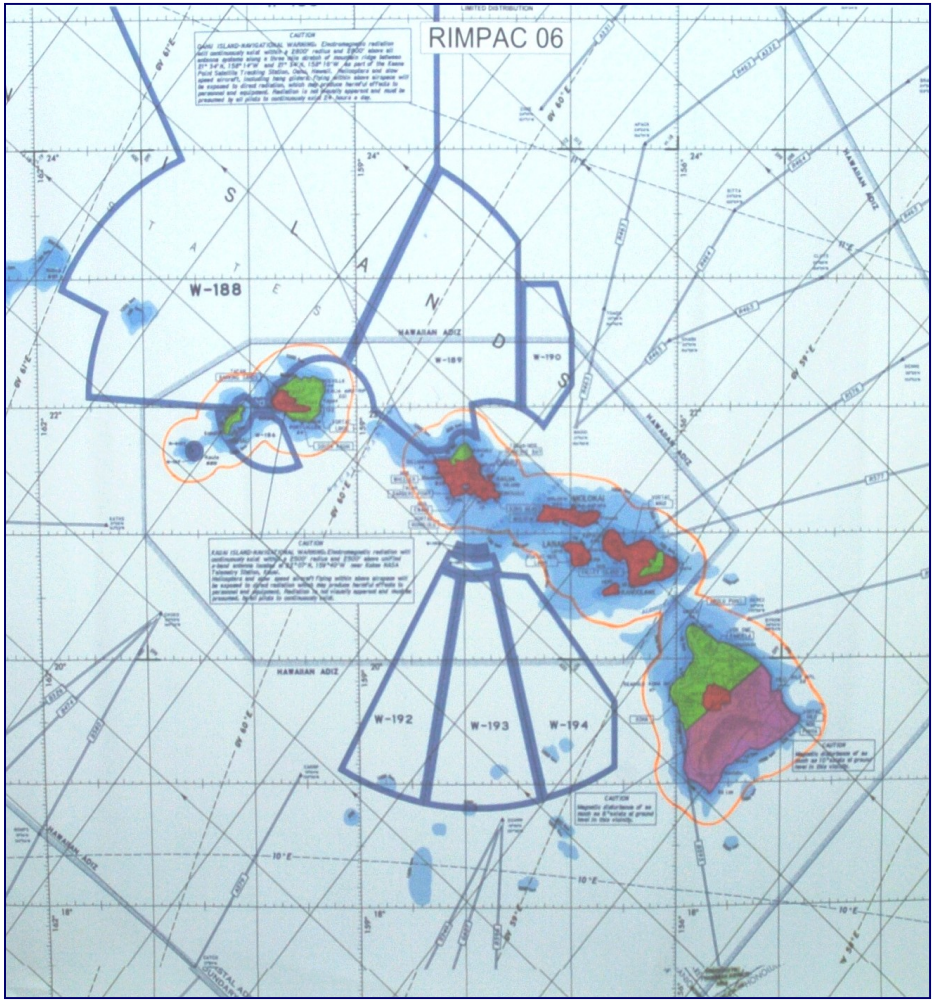
Estimated annual impact on marine mammals from various sources

• Global fishing by-catch (2003)[1]	650,000
• U.S. fishing by-catch[2]	6,215
• Strandings on U.S. shorelines (1990-2000)[3]	3,600+
• World-wide strandings correlated with sonar use (1996-2004) *All were beaked whales*	5

Notes:
[1] International Council for the Exploration of the Sea Report, 2004
[2] Duke University, University of St. Andrews
[3] National Marine Fisheries Service

RIMPAC OVERVIEW

- **Largest multi-national maritime exercise**
  - **U.S. plus seven nations**
  - **35-40 ships**
  - **7 submarines**
  - **> 100 aircraft**
  - **19,000 Sailors, Marines, Soldiers, and Airmen**
- **20th in series, biennial, June/July**
- **Within Hawaii's OPAREA - 210,000 nm²**



RIMPAC ENVIRONMENTAL COMPLIANCE

- **National Environmental Policy Act (NEPA)**
  - **Navy – Support Programmatic Environmental Assessment/public notice/FONSI**
  - **NMFS – Environmental Assessment/public notice/FONSI, mitigation considerations**
- **Marine Mammal Protection Act (MMPA)**
  - **Incidental Harassment Authorization (IHA) w/mitigation**
  - **6-month SECDEF National Defense Exemption (NDE)**
- **Endangered Species Act (ESA)**
  - **Formal consultation w/NMFS**
  - **NMFS Biological Opinion/Incidental Take Statement (BO/ITS)**

MMPA NATIONAL DEFENSE EXEMPTION

- **Authority: 16 U.S.C. 1371(f)**
- **Scope: All military readiness activities employing MFA sonar use during**
  - **Major training exercises, or**
  - **Within established DoD maritime ranges or established OPAREAs**
- **Term: 6 months from date of execution (30 Jun 06)**
- **Coordination**
  - **SECCOMM**
  - **CEQ**
- **Additional terms**
  - **Navy/Commerce work to "address the analysis and regulatory steps necessary to come into full compliance with the requirements of the MMPA"**
  - **PIMPAC 2006: Employ IHA mitigation measures**
  - **All other exempted activities: Modified version of IHA measures**

RIMPAC TRO LITIGATION

- **3 July 06 – U.S. District Court (Cent. Dist. of Cal.) issued Temporary Restraining Order (TRO) enjoining Navy from using MFA sonar**
  - **Likelihood Navy NEPA document (EA) is legally deficient**
  - **Harm to Navy outweighed by potential harm to the environment**
- **5-7 July 06 – Parties conducted Court-ordered "meet and confer" on additional mitigation measures**
- **7 July 06 – Parties agreed on additional mitigation, signed settlement agreement, Court dissolved TRO, and Navy withdrew its emergency appeal to the 9th Circuit Court of Appeals**

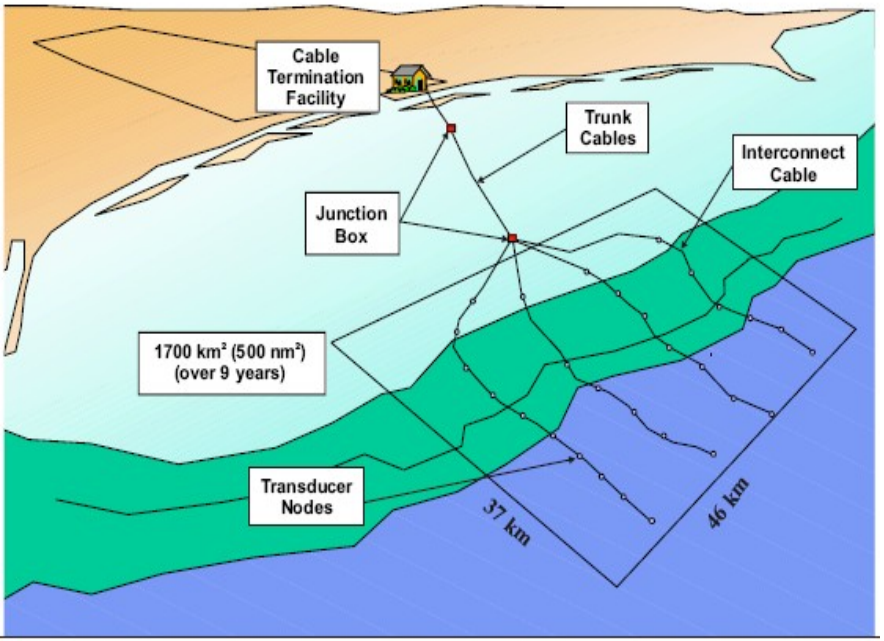
RIMPAC LESSONS LEARNED

- **Despite MMPA NDE, Navy MFA sonar testing and training remains vulnerable to judicial challenge/TRO (e.g., NEPA, ESA)**
  - **NEPA considerations**
  - **ESA considerations**

BACKGROUND: USWTR PROPOSED ACTION

- **Proposed Action: Instrument a 500 nm² ocean area with undersea cables and sensor nodes to use the area for Atlantic Fleet anti-submarine warfare (ASW) training**
- **Purpose and Need: Effective ASW training is essential to counter the growing threat posed by increasingly quieter submarines**

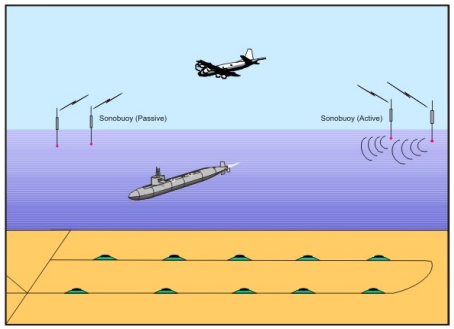
SWTR Range Concept



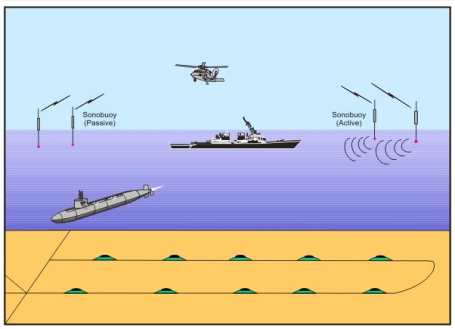
- **Training with active sonar required for ASW proficiency**
- **Diesel submarine threat proliferating**
  - **Anti-submarine warfare training is critical**
  - **Use of active sonar for ASW is critical**
  - **Threat to access for projecting Navy power into areas of conflict**
  - **Over 90% of U.S. fighting forces flow into overseas theaters by sea**
  - **Quiet submarine threat heightened by their operation mainly in the noisy, shallow waters of the littoral**
- **Instrumented range optimizes training effectiveness**
  - **Replicates strategic areas**
  - **Instrumentation provides ground truth feedback**

TRAINING SCENARIOS

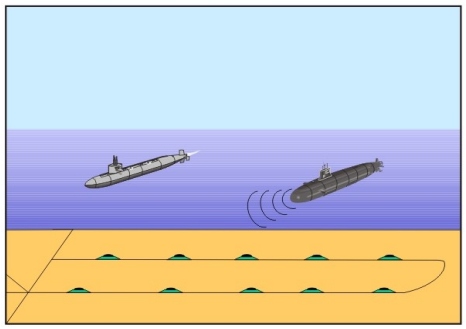
Range Use Scenario 1



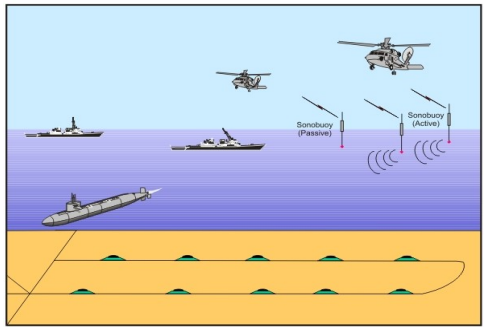
Range Use Scenario 2



Range Use Scenario 3



Range Use Scenario 4



Component	Scenario 1 AIRLANT	Scenario 2 AIRLANT/SURFLANT	Scenario 3 SUBLANT	Scenario 4 COMSECONDFLT
Exercise Participants	One fixed- or rotary-wing aircraft vs. one submarine target	**One ship and one helicopter vs. submarine target**	**One submarine vs. one submarine target**	**Two surface ships and two helicopters vs. submarine target**
Exercise Weapons	Lightweight EXTORPs & lightweight REXTORPs	Lightweight/heavyweight EXTORPs, REXTORPs, 1/yr VLA	Heavyweight EXTORPs	Lightweight/heavyweight REXTORPS, 1/yr VLA
Active Acoustic Sensors & Sources	Sonobuoys, dipping sonar, range pingers, fathometers, torpedo sonar, and underwater communication devices			
		& ships' sonar	& submarine sonar	& ships' sonar
Other Devices	Sonobuoys (active & passive), target simulators, submarine acoustic countermeasures, and expendable bathythermographs (XBTs)			
Frequency of Exercise	98 events per year (approx 6 hrs/event)	**30 events per year (approx 6 hrs/event)**	**15 events per year (approx 6 hrs/event)**	**18 events per year (approx 6 hrs/event)**

MARINE SPECIES MONITORING AND MITIGATION

- **Mitigation Procedures**
  - **Marine species awareness training for Navy personnel**
  - **Range Operations**
    - **Lookouts for visual detection by ships, surfaced submarines, and aircraft**
    - **Limit transmission levels when marine mammals detected within 350 yds**
    - **Protective measures during near-shore transit for migrating North Atlantic right whales**
  - **Landside construction**
    - **ESA consultation initiated**
    - **Sea turtles**
    - **Sea Beach Amaranth**
    - **Piping Plover**
    - **Biologist on site during construction**

- **Long-term monitoring program and conservation measures**
  - **Baseline population studies for 2 years prior to range operations**
  - **Continued evaluation of population trends over time and reporting to National Marine Fisheries Service**
  - **Research support to improve the understanding of effects of sound on marine species**

MONITORING AND CONSERVATION

- **Long-term monitoring program and conservation measures**
  - **Baseline population studies for 2 years before range operations**
  - **Continued evaluation of population trends over time and reporting to National Marine Fisheries Service**
  - **Research support to improve the understanding of effects of sound on marine species**
  - **Evaluating whether monitoring of fish can be effectively included (suggested from Marine Fisheries Commissions/Fishery Management Councils)**

SPECIAL CONSIDERATION – BEAKED WHALES

- **Specific mechanisms leading to beaked whale strandings that may be associated with SQS-53C use are not understood – DOEIS/EIS discusses**
  - **Greek Islands (1996)**
  - **Bahamas (2000)**
  - **Canary Islands (2002)**
- **Navy adopted NMFS recommendation to count all predicted Level B exposure levels as Level A harassment in lieu of establishing special criteria/thresholds for beaked whales**
- **Estimated annual beaked whale Level B acoustic exposures for preferred alternative are 29 incidents**

WAY AHEAD

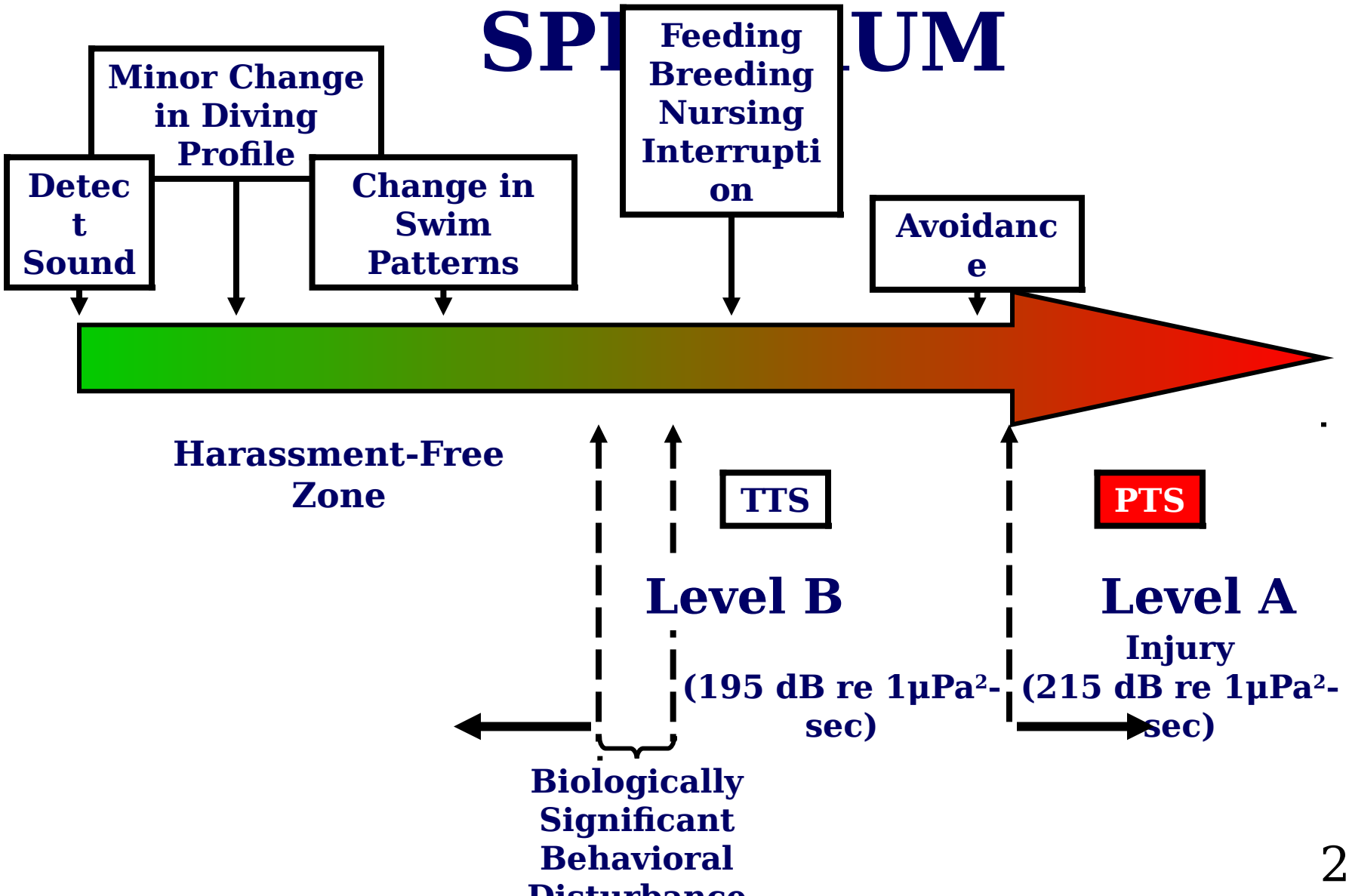
- **Goal: Compliant, legally defensible, environmental planning strategy that both protects the marine environment and satisfies operational planning requirements**
  - **Training Ranges/OPAREAs compliance (FY09)**
  - **NEPA EIS, including MMPA LOA and ESA BO/ITS**

WAY AHEAD

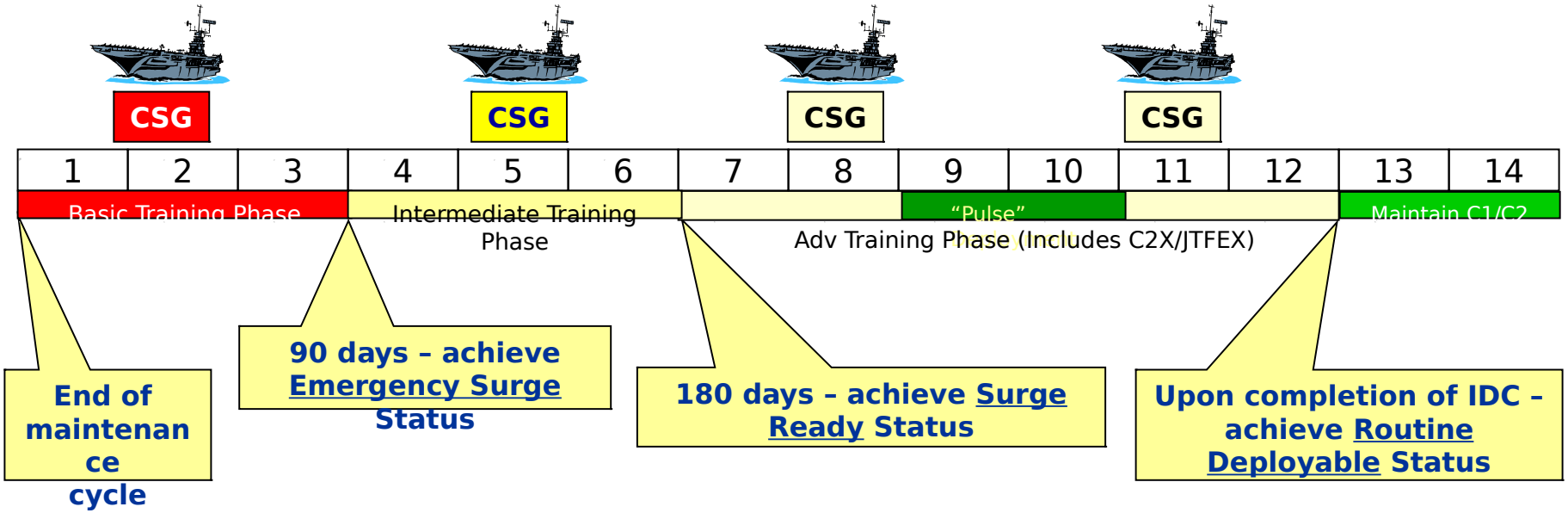
- **Next 6 months**
  - **NDE for MMPA (with mitigation)**
  - **Complete EAs/OEAs, conduct ESA consultations**
  - **Continue implementation of long term compliance plan**
- **Long term**
  - **Analyze environmental impacts for major training exercises, complete EAs/OEAs, conduct ESA consultations, and submit for IHAs for MFA sonar uses**
  - **Continue to analyze environmental impacts on ranges/OPAREAS with the goal of completing EISs/LOAs/BOs by the end of FY09**

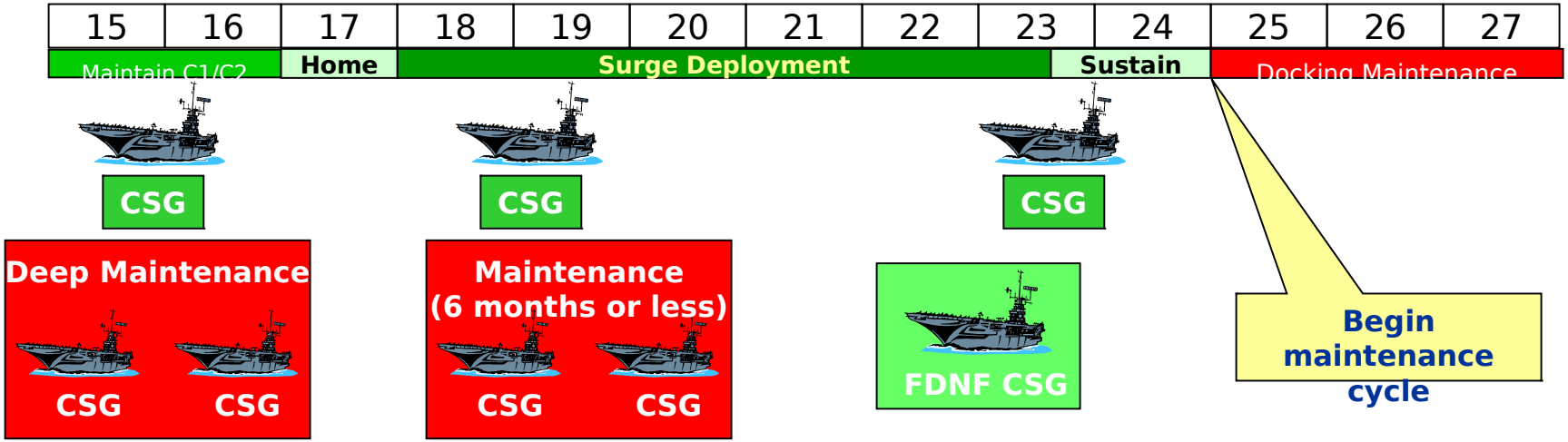
BACK UP SLIDES

CONCEPTUAL ACOUSTIC EFFECTS SPECTRUM



FLEET RESPONSE PLAN


CSG
CSG
CSG
CSG
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Basic Training Phase
Intermediate Training Phase
"Pulse"
Adv Training Phase (Includes C2X/JTFEX)
Maintain C1/C2
End of maintenance cycle
90 days – achieve Emergency Surge Status
180 days – achieve Surge Ready Status
Upon completion of IDC – achieve Routine Deployable Status



ENVIRONMENTAL CONSIDERATIONS

- Navy required to assess effects of its actions
  - National Environmental Policy Act (NEPA)
  - Executive Order 12114
- Effects on marine environment
  - Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) are the major focus
  - Authorization for incidental take by harassment under MMPA
  - Section 7 consultation under ESA
  - NOAA National Marine Fisheries Service is a cooperating agency for the preparation of most EAs/EISs
  - Potential for effects on fishing, fish habitat, recreational diving are evaluated for environmental and socio-economic impacts

EVALUATING EFFECTS ON MARINE MAMMALS

- **Potential effects are categorized as either physiological or behavioral effects to relate them to the MMPA harassment definitions**
  - **Level A harassment is solely associated with physiological effects**
  - **Both physiological and behavioral effects may cause Level B harassment**
- **The primary physiological effects of sound are on the auditory system**
  - **Auditory Threshold - Lowest sound level that may be heard at a given frequency**
  - **Threshold Shift (TS) - Increase in auditory threshold (hearing is worse) after exposure to sound**
  - **Temporary Threshold Shift (TTS) - Hearing returns to normal after some period of time, with no loss of tissue or hearing function**
  - **Permanent Threshold Shift (PTS) - Hearing does not completely recover; there is some permanent hearing loss and destruction of tissues within the auditory system**
- **PTS and TTS are used in OEISs/EISs as the biological indicators of physiological effects**

PROTECTIVE MEASURES ASSESSMENT PROTOCOL

- Units will apply PMA software for geographic area
  - Factors in Bahamas stranding event are stressed – several ships emitting over extended period near shore, significant surface duct, lack of escape routes for MMs, deep water near shore
- If possible, clear area of MMs with airborne units
- Surface units will use trained lookouts
- If MMs detected
  - within 450 yds, limit active transmission levels to no higher than 229dB
  - within 200 yds, cease active sonar transmissions and maneuver to avoid

IHA MITIGATION

- **Do not operate MFA within 25 km of the 200 m isobath**
  - **Except during choke point exercises**
- **Decrease intensity when within 1000 m (6 dB)**
- **Decrease intensity further within 500 m (4 dB)**
- **Cease transmissions/maneuver when within 200 m**
- **Choke point mitigations**
  - **Dedicated lookout on all radiating ships**
  - **Two non-Navy observers embarked**
  - **Dedicated monitoring platform with direct link to each ship**
  - **Shoreline reconnaissance**
- **During significant ducting conditions:**
  - **Decrease intensity when within 2000 m (6 dB)**
  - **Decrease intensity when within 1000 m (4 dB)**
  - **Cease transmissions if within 500 m**
- **During low visibility conditions:**
  - **Use infrared or enhanced passive acoustic detection**
  - **If detection of marine mammals is not possible out to safety zone, decrease intensity as if marine mammals were in the safety zone**
- **Submit post-exercise report**

NDE MITIGATIONS

- **Differences from RIMPAC IHA**
  - **Do not operate MFA within 12 nm of a coast except for military readiness activities at established ranges at San Clemente Island and PMRF**
  - **Choke point mitigations**
    - **Must consult with N45 on all choke point exercises**
    - **Navy and NMFS mutually agreed on non-Navy observers**
    - **Dedicated monitoring platform with direct link to each ship before, during, and after the exercise**
    - **Shoreline reconnaissance not required**